

Time of Day (TOD) Profiles

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Snuller Price

Overview

- Introduction of TOD Factors in the CPUC Market Price Referent (MPR) Proceeding
- IOU TOD Methodology Overview
- Comparison of IOU TOD factors
- Example PV and base load bids
- Conclusions

TOD Factors in MPR Proceeding

- CPUC required by RPS legislation to establish an appropriate market price referent (MPR)
- 2004 MPR – Baseload & Peaker MPR
 - PG&E and SCE use TOD factors in Least-Cost/Best Fit bid evaluation
- 2005 MPR – Baseload MPR & TOD factors

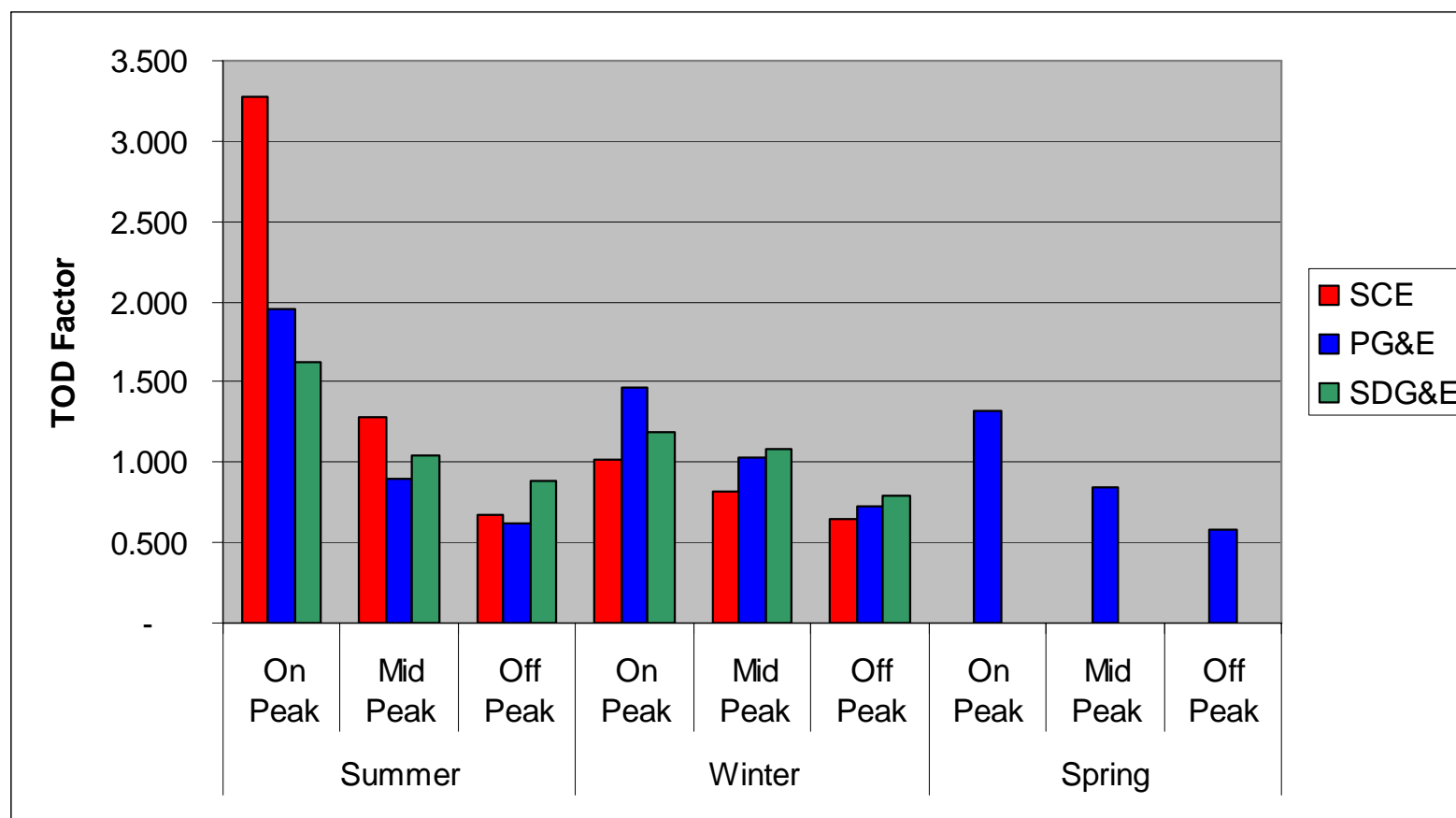
TOD Approach allows the MPR to be differentiated for any output profile (solar, wind, baseload, etc.)

– Adjusted MPR = Baseload MPR * TOD Factor (for each period)

TOD Methodology Overview

- Proprietary Methods for each IOU (SDG&E, SCE, PG&E)
- Summary of Approach Described in MPR Proceeding
- Summary of Methodologies Described by IOUs
 - Forecast of future energy prices
 - NYMEX, broker quotes, third-party forecasts
 - Translate to hourly prices and then average over TOD periods
 - Estimate capacity values (PG&E & SCE)
 - SCE: Option Analysis → LOLP Allocation
 - PG&E: Cost of CT → Net Energy Benefit in each period (Black option model) → Net Capacity Cost
 - Normalize combined energy & capacity value

Comparison of IOU TOD Factors



TOD Benchmarking Proposals

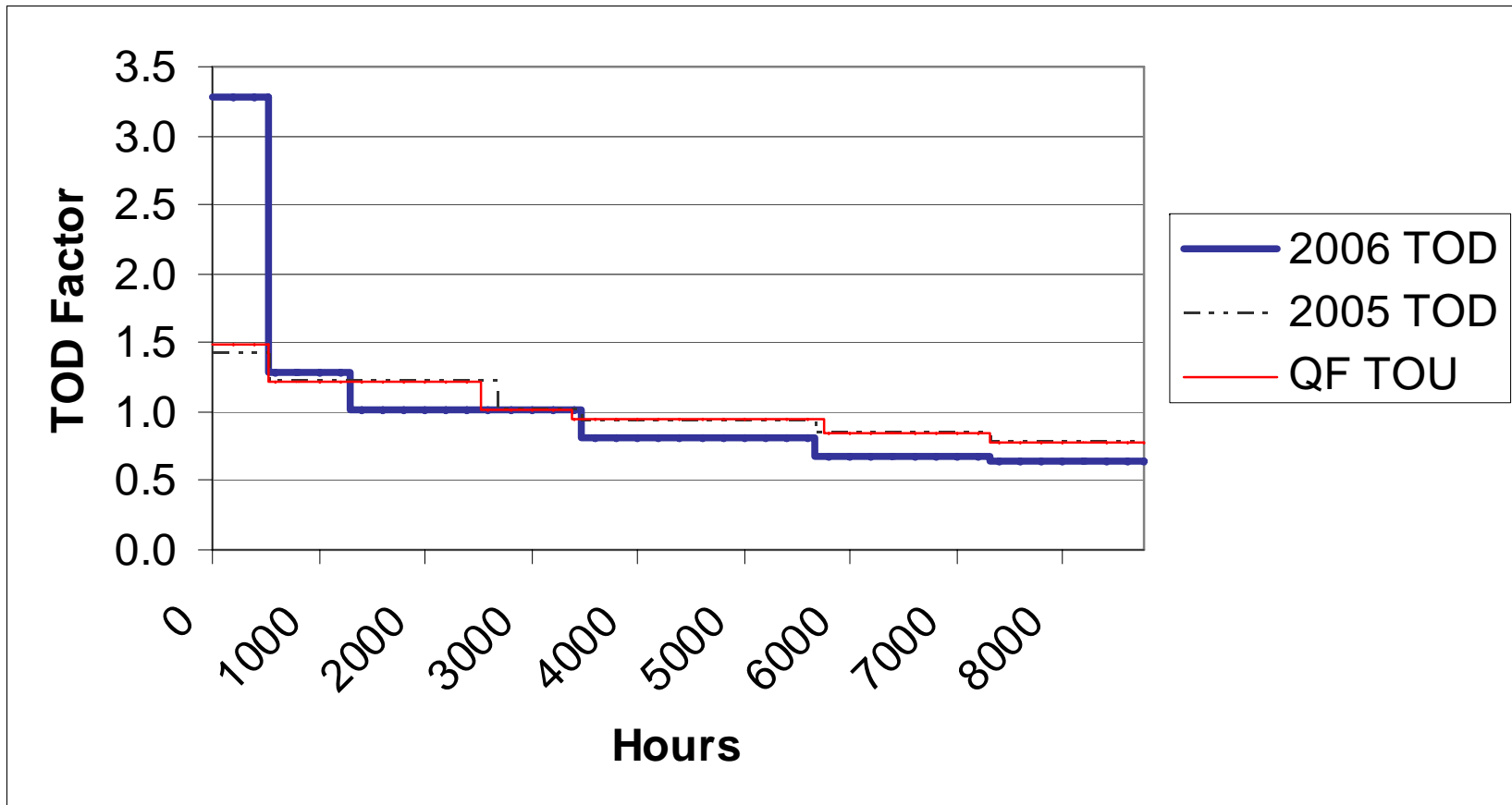
CPUC Requested IOUs file Benchmarking Proposals for their TODs

SCE	<ul style="list-style-type: none">– Broker forward quotes– Deferral value of CT Proxy (instead of option analysis)– Apply PX shape (instead of SCE proprietary load and price correlation)– Allocate capacity value by LOLP (Phase 2 General Rate Case)
PG&E	<ul style="list-style-type: none">– Calculate On-Peak (6x16) TODs from Platts, compare TOD's for same time periods calculated using RPS methodology– CT costs from market bids or MPR documentation– Black option analysis using Platts data (Correlations and implied volatility)
SDG&E	<ul style="list-style-type: none">– Submit redacted calculations and data– SDG&E's method adjusts historical PX prices (E3 Avoided Costs) to match forward market data

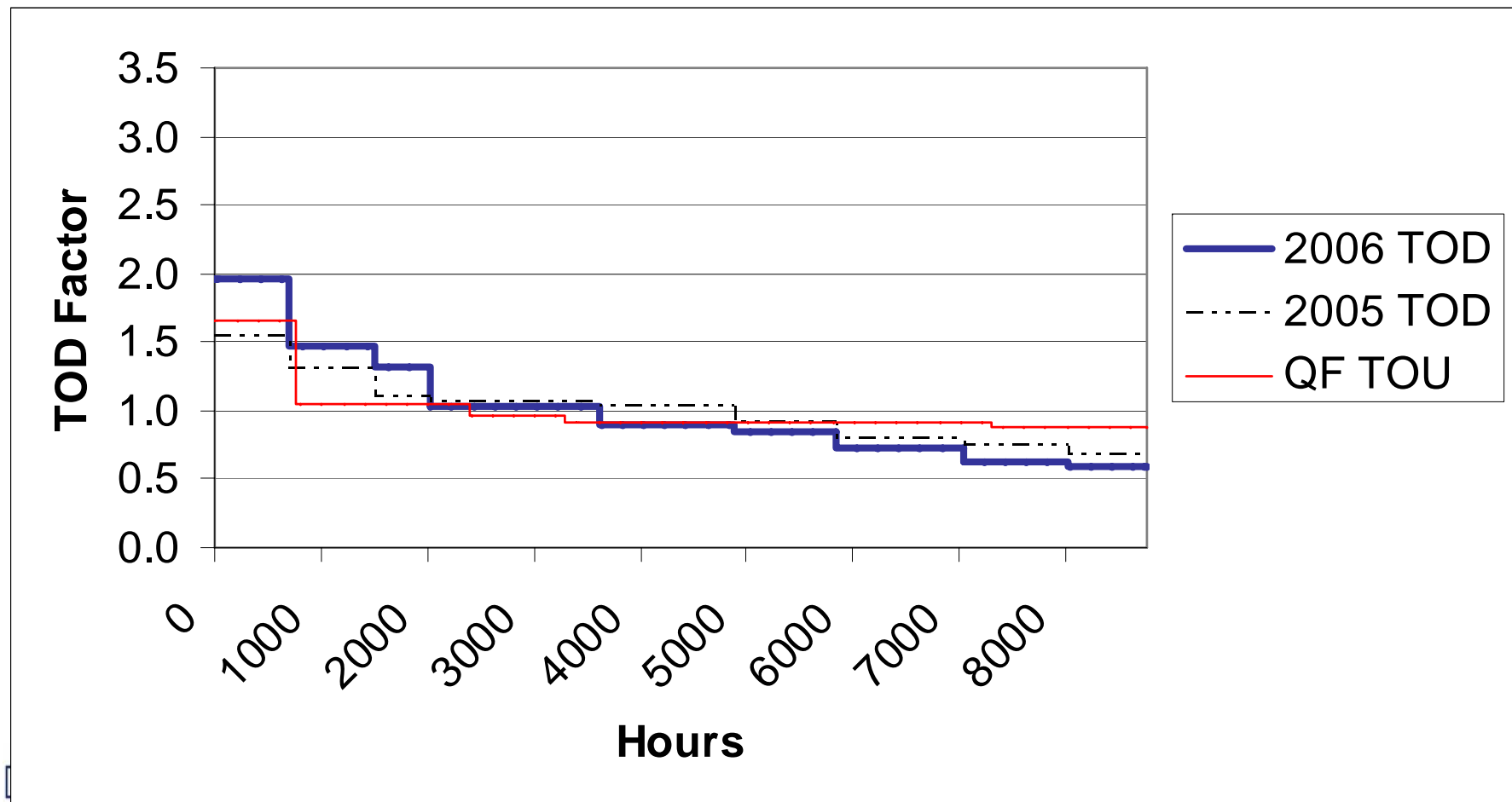
Comparing RPS TOD and QF TOU based factors

- QF SRAC formulas include both energy and capacity components
- Allocated avg. annual energy price of \$80/MWh to TOU period according to QF TOU factors
- Assign approved capacity costs to TOU period according to capacity allocation factors
- Normalize sum of energy and capacity components to compute comparable TOD factors

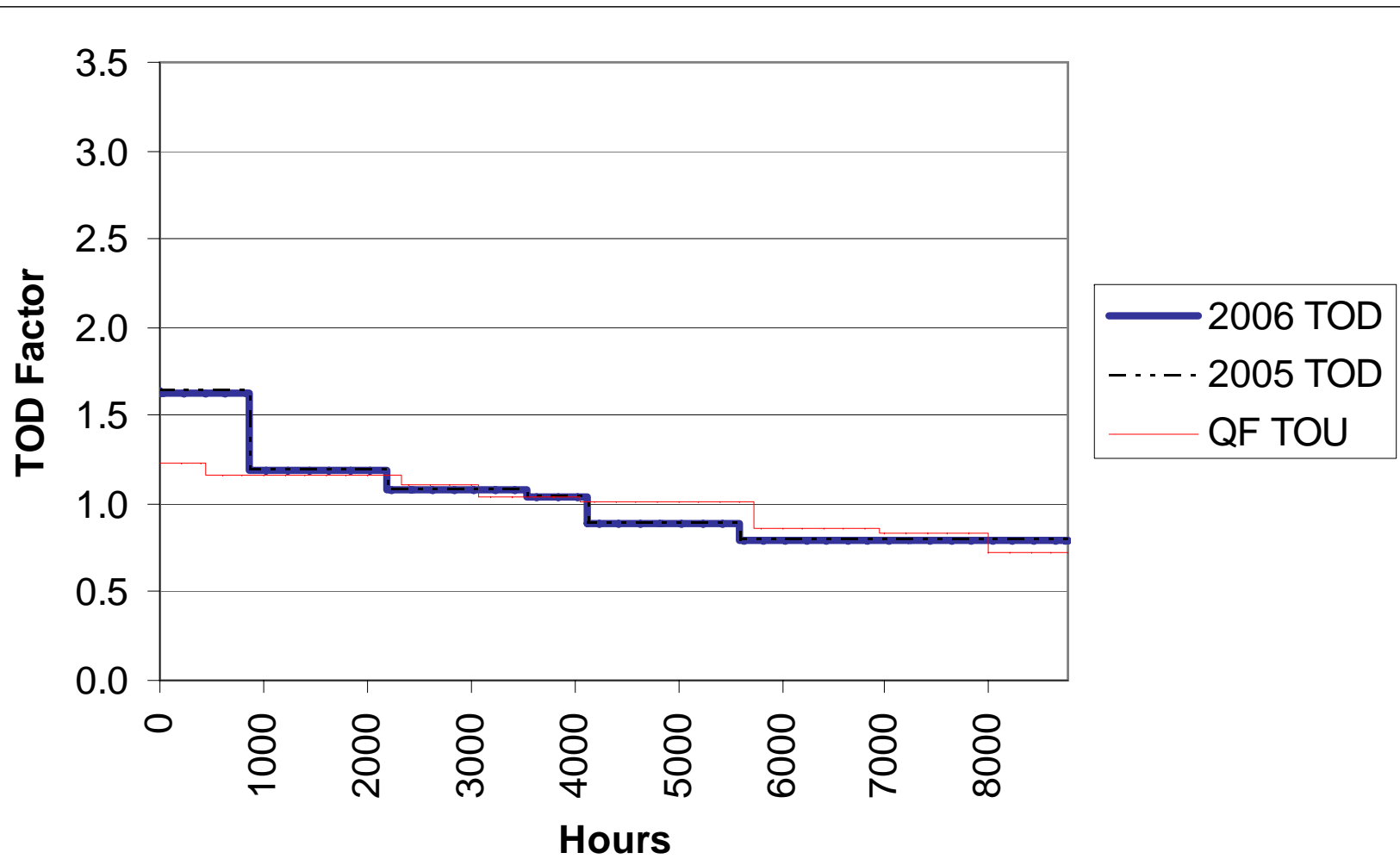
SCE TOD Factors



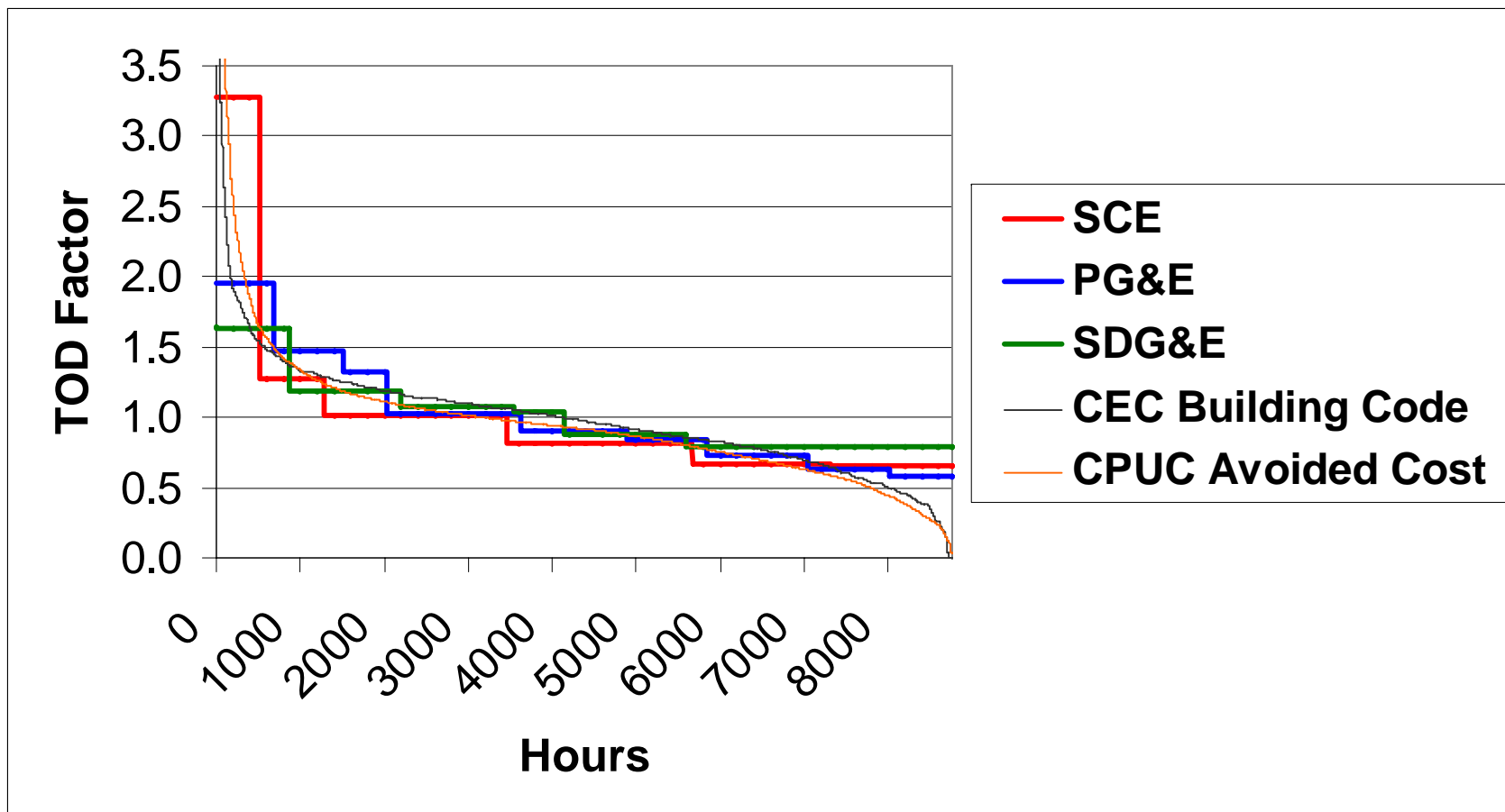
PG&E TOD Factors



SDG&E TOD Factors



2006 TOD Factors compared with CEC Non-Proprietary Avoided Costs



Solar Example

- Comparison of three comparable bids for a solar output shape
- Contract price for each is \$95/MWh
- SCE does not use SEPs, PG&E, SDG&E do

Row	Calculation	Value	SCE	PG&E	SDG&E
1		Baseload MPR	\$79.14	\$79.14	\$79.14
2		Annual Avg. TOD Factor	1.24	1.12	1.10
3	=1*2	Levelized TOD MPR	\$97.76	\$88.71	\$87.02
4		Levelized Bid Price	\$76.90	\$84.75	\$86.40
5		Annual Avg. TOD Factor	1.24	1.12	1.10
6	=4*5	Levelized Final Bid Price*	\$95.00	\$95.00	\$95.00
7	=Min (3,6)	Levelized Utility Payment	\$95.00	\$88.71	\$87.02
8	=Max(6-3,\$0)	Levelized SEP Payment	\$0.00	\$6.29	\$7.98

Baseload Example

- Comparison of three comparable bids for a baseload output shape
- Contract price for each is \$95/MWh
- TOD factors do not change results

Row	Calculation	Value	SCE	PG&E	SDG&E
1		Baseload MPR	\$79.14	\$79.14	\$79.14
2		Annual Avg. TOD Factor	1.00	1.00	1.00
3	=1*2	Levelized TOD MPR	\$79.14	\$79.14	\$79.14
4		Levelized Bid Price	\$95.00	\$95.00	\$95.00
5		Annual Avg. TOD Factor	1.00	1.00	1.00
6	=4*5	Levelized Final Bid Price*	\$95.00	\$95.00	\$95.00
7	=Min (3,6)	Levelized Utility Payment	\$79.14	\$79.14	\$79.14
8	=Max(6-3,\$0)	Levelized SEP Payment	\$15.86	\$15.86	\$15.86

Conclusions

- TOD factors change the level of SEPs and utility payments for RPS contracts, but not the overall payment that winning bidders receive
- Difficult to know whether differences in TOD factors are due to methodology or utility circumstances

TOU Period Definitions

TOD Season

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SCE												
PG&E	Winter		Spring			Summer				Winter		
SDG&E												

RPS TOD Summer Weekday Periods

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
SCE	Off								Mid				On						Mid				Off	
PG&E	Off						Shoulder						On								Shldr			Off
SDG&E	Off						Semi			On									Semi				Off	

QF TOU Summer Weekday Periods

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
SCE	Off							Mid					On					Mid				Off		
PG&E	Off	Super Off				Off				Partial			Peak					Partial				Off		
SDG&E	Super Off				Off	Semi					On					Semi				Off				